Memorandum

Estimates of 1996 U.S. Military Expenditures on Defending Oil Supplies from the Middle East: Literature Review

Revised August, 1997

Patricia S. Hu
Oak Ridge National Laboratory

Prepared for
Office of Transportation Technologies
U.S. Department of Energy

Prepared by the
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831-6366
managed by
LOCKHEED MARTIN ENERGY RESEARCH CORP.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-96OR22464

Executive Summary

Estimates of 1996 military expenditures for defending oil supplies in the Middle East range from $6 to $60 billion per year. The average value of the estimates in the literature is $32 billion in 1996.

This wide range in the estimates reflects the difficulty in assigning a precise figure to the military cost of defending U.S. interests in the Middle East. There are essentially two reasons for this difficulty. First, the Department of Defense's budget cannot be divided into regional defense sectors. Second, it is extremely difficult to determine how much of the cost is attributable to defending Persian Gulf oil.

Throughout the literature, two basic estimation techniques are used. The first approach is used by the General Accounting Office (GAO) in its 1991 report. This approach identifies four different military program budgets. GAO estimated that, from 1980 to 1990, about $33 billion of the U.S. military's dollars were spent per year on defending oil supplies in the Middle East. Two subsequent studies attempted to improve this approach by separating the portion of the expenditures that is truly "attributable" to defending oil supplies in Southwest Asia from the portion of the expenditures that "would be funded" even if the Southwest Asia mission were eliminated. These studies arrive, respectively, at an estimate of about $6.4 billion per year from 1980 to 1990, and an estimate of $14.3 billion per year.

The second approach is based on regional cost estimates. In essence, the military cost of defending a specific region such as Europe or the Middle East is proportional to the level of active land divisions in that region. Assuming that real costs will not increase, one study projected the nominal dollars of Middle East defense to be $60 billion per year from 1992 to 2002. A second study estimated that defense of the Middle East region costs $64.5 billion in FY1990, but suggested that this figure will decline to $55 billion by FY1996, and $29 billion by FY2001. The third paper judged that the U.S. spends at least $20 billion, and perhaps as much as $40 billion, in peacetime to protect its interests in the Persian Gulf.

With the total Defense budget having declined by as much as 40% since the Cold War, projections of U.S. military spending for defending oil supplies in the Middle East during peacetime likewise will probably decline or remain stable. The consensus in the literature is that results should be interpreted as being indicative of general patterns and not precise estimates because much of the analysis is judgmental.

Memorandum

Estimates of 1996 U.S. Military Expenditures on Defending Oil Supplies from the Middle East: Literature Review

Background

Estimates of U.S. expenditures to defend the Persian Gulf region vary widely for two reasons. First, the Department of Defense declines to divide its budget into regional defense sectors. Second, it is extremely difficult to determine precisely how much of the cost is truly attributable to defending oil supplies in the Middle East. Current literature was reviewed to provide an up-to-date estimate of military expenditures on defending oil supplies from the Middle East. Two basic estimation techniques are used throughout the literature and are summarized below.

Program Approach

One technique is used by the General Accounting Office (GAO) in its 1991 report. In this approach, four different spending categories are identified. They are:

1. U.S. military programs and activities in the region;
2. bilateral military and economic assistance to countries in the area;
3. multilateral economic assistance to countries in the Middle East; and
4. non-military assistance to any petroleum-producing country for petroleum-related activities.

GAO estimates that a total of $366 billion of the U.S. military's dollars were spent on defending oil supplies in the Middle East from 1980 to 1990, about $33 billion per year (unadjusted for inflation).

Two subsequent studies ([2] and [3]) basically follow this technique. However, these studies attempt to separate the portion of the expenditures that is truly "attributable" to defending oil supplies in the Southwest Asia from the portion of the expenditures that "would be funded" even if the Southwest Asia mission were eliminated. For example, the Congressional Research Service (CRS) states that other than oil supply, U.S. interests in the region also include ensuring the security of Israel, reducing the conflict between Arab nations and Israel, and protecting U.S. citizens in the

region [2]. Therefore, one cannot attribute all expenditures in the Middle East to defending oil supplies. After removing the expenditures that "would be funded" even if the Southwest Asia mission were eliminated, the CRS arrives at an estimate of less than $71 billion from 1980 to 1990 - about $6.4 billion per year.

Nonetheless, CRS' argument that U.S. military forces in the Middle East protect not only oil supplies but also other U.S. interests was questioned by Delucchi and Murphy [6]. They assert that the U.S. interest in the Persian Gulf is predominantly to maintain the region's stability and, thus, to prevent oil supply disruptions and sudden increases in its price, and the associated macroeconomic effects. They also argue that although the U.S. imports only a small portion of its oil from the Persian Gulf region (Table 1), Persian Gulf countries can have a consequential influence on the world oil price and, thus, on the economic welfare of the United States.

Table 1. Sources of Crude Oil Supplied in the United States, 1993

Source	Percent
Domestic Production	50.2%
Non-OPEC Imports[1]	22.7%
Other OPEC[2]	15.0%
Persian Gulf Imports - OPEC[3]	12.0%

[1] Mexico and Canada each supply approximately 30 percent of non-OPEC imports.

[2] Nigeria and Venezuela supply about 40 percent of the oil from non-Gulf members of OPEC. Indonesia, Gabon, Ecuador and Algeria supply the remaining part.

[3] Saudi Arabia supplies virtually all of oil from the Gulf that is sent to the U.S.

Source: Cited from Delucchi and Murphy [6], p. 28. Energy Information Administration, *Petroleum Supply Annual 1993, Volume 1.*

Greene and Leiby in [3] assign an "attribution factor" to each of the aforementioned spending categories. Again, the purpose of this factor is to identify the portion of the expenditures that is attributable to defending oil supplies in Southwest Asia. These factors are entirely based on

professional judgement. Table 2 summarizes different military expenditures estimates based on this approach.

Regional Cost Approach

The second approach is based on regional cost estimates that assign total defense costs of general-purpose forces to the defense of specific regions such as Europe or the Middle East. In essence, the military cost of defending each region is proportional to the level of active land divisions in that region. Two studies using this approach are widely cited in the literature: Ravenal [4] and Kaufmann and Steinbruner [5]. Ravenal argued that since the Central Command (which has responsibility for defending the Middle East) has 4 of the total 17 divisions of land forces, the cost of defending the Middle East is 4/17 of the $215 billion total for 1991 general purpose forces, or $50 billion. Assuming that real costs will not increase, Ravenal projects the nominal dollars of Middle East defense to be $60 billion per year from 1992 to 2002.

Based on similar principles, Kaufmann and Steinbruner [5] calculate the budget authority allocated to U.S. force planning contingencies. They estimate that defense of the Middle East region was allocated $64.5 billion in FY1990. They project that this figure will decline to $55 billion by FY1996, and $29 billion by 2001. Based on work by Ravanal [4] and Kaufmann and Steinbruner [5], and without a formal analysis, Delucchi and Murphy judge that the U.S. spends at least $20 billion, and perhaps as much as $40 billion, in peacetime to protect its interests in the Persian Gulf [6]. Table 3 summarizes estimates based on the second approach.

Table 2. Estimates of Total Military Expenditures for Defending Oil Supplies in Southwest Asia Based on GAO's Approach, 1980-1990 (Billions of 1990 $)

Expenditure Category	GAO [1]	CRS [2]	Greene and Leiby [3]
Military programs and activities	**$361.0[1]**	**$4.7**	**$126.9**
1. Southwest Asia-dedicated programs	$21.4	$4.5	$21.4
2. Southwest Asia-oriented programs	$5.8	-	$5.8
3. Other contingencies and mobility	$272.6	-	$90.9
4. Incremental cost of other military operations	$0.2	$0.2	$8.8
- Kuwaiti reflagging	$0.2	$0.2	$0.2
- Operation Desert Shield and Desert Storm	$61.0[1]	-	$8.6
Bilateral military and economic assistance	**$59.2**	**$59.2**	**$29.6**
1. Military assistance	$30.9	$30.9	$15.4
- Foreign Military Financing Program	$30.3	-	-
- Military Assistance Program	$0.5	-	-
- International Military and Education Training	$0.08	-	-
2. Economic assistance	$28.3	$28.3	$14.2
Multilateral economic assistance	**$6.6**	**$6.6**	**-**
Bilateral and multilateral non-military assistance	**$0.6**	**0.5**	**0.1**
ESTIMATED *ANNUAL* EXPENDITURE	**$33.0**	**$6.4**	**$14.3**

[1] The U.S. is still receiving contributions from its allies, which it expects will cover most of the incremental cost to the U.S. Consequently, $61 billion for Operations Desert Shield is excluded from the total.

Table 3. Annual Military Expenditures Estimate on Defending the Southwest Asia Based on Regional Cost Estimate Approach

	Billions of 1992 $	Projection (Billions of 1996 $)
Ravenal, 1991	$50 for FY1992	$60 for FY1996
Kaufmann and Steinbruner, 1991	$64.5 for FY1990	$55 for FY1996
Delucchi and Murphy, 1996	$20 - 40 for recent years	--

Military Expenditures for Defending Oil Used in Highway Transportation

In addition to the total military expenditures for defending oil supplies in the Middle East, Delucchi and Murphy further estimate the military cost of defending oil used in highway transportation [6]. They address the question in four stages. First, they ask the question of how much military expenditure would be foregone if there were no oil in the Persian Gulf region. Their estimate is between $10 and $30 billion per year, roughly from 1992 to 1996.

Next, they ask the question of how much military expenditure would be foregone if the U.S. did not produce or consume oil from the Persian Gulf oil but other countries still did. Delucchi and Murphy estimate that it would have costed between $5 and $15 billion per year to protect against the possibility of a world-wide recession due to the effects of an oil-price shock related to the use of Persian Gulf oil by *other* countries. Under this scenario, this potential world-wide recession would harm the U.S. economy even though the U.S. did not produce or consume Persian Gulf oil.

Then, they ask the question of how much military expenditure would be foregone if U.S. producers have investments in the Persian Gulf, but the U.S. did not consume Persian Gulf oil. Delucchi and Murphy estimate that if U.S. petroleum companies and other U.S. individuals owned

41%[1] of the total assets of their foreign affiliates in the Middle East, then the value of U.S. investment in the petroleum industry in the region was at least $4 billion per year [6, p. 17]. On the other hand, the U.S. has been importing about $10 billion worth of oil per year from Middle East countries. Based on these statistics, Delucchi and Murphy estimate that it would have cost between $2.5 to $10 billion to defend the investments of U.S. oil producers in the Persian Gulf apart from the interests of U.S. oil consumers.

Finally, Delucchi and Murphy ask the question of how much military expenditure would be foregone if motor vehicles in the U.S. did not use oil, but other sectors continue to consume Persian Gulf oil and the U.S. continues to invest in Persian Gulf oil. Without developing a formal model of the regional supply of oil to the motor vehicle sector, they speculate that between 25% and 70% of the oil imported from the Gulf is consumed by the motor-vehicle sector and 75% to 30% by other sectors [6]. This assumption leads to an estimate that if U.S. motor vehicles did not use petroleum, the U.S. would reduce its defense expenditures in the long run by roughly $0.6 to $7 billion per year [6].

Challenges in Estimating Military Expenditures for Defending Middle East Oil Supplies

Estimates in the literature of military expenditures for defending Middle East oil supplies range from $7 billion to as much as $65 billion per year. This wide variation in the estimates reflects the difficulty in assigning a definite figure to the military cost of defending U.S. interests in the Middle East. As mentioned earlier, the challenge largely stems from two reasons. First, the Department of Defense's budget cannot be divided into regional defense sectors. Second, it is extremely difficult to determine how much of the cost is attributable to defending Persian Gulf oil.

Using the projected trends in the Defense budget [7] and a linear extrapolation, we calculate that estimates of 1996 military expenditures for defending oil supplies in the Middle East range from

---

[1] Since data on the ownership of total asset by country are not available, Delucchi and Murphy use data on the external financial position of foreign affiliates in the petroleum industry. At the close of 1992, U.S. parent companies and other U.S. individuals owned 41% of the external funds of their foreign affiliates.

$6 to $60 billion per year (Table 4). The average value of these six estimates is $32 billion in 1996 (with a standard deviation of $22 billion). The estimated range of $20 to $40 billion per year provided by Delucchi and Murphy is essentially at the midpoint of these estimates. With the total Defense budget having declined by as much as 40% since the Cold War (Figure 1), projections of U.S. military spending for defending oil supplies in the Middle East during peacetime will probably decline or remain stable.

The consensus of the literature is that results should be interpreted as being indicative of general patterns and not precise estimates because much of the analysis is judgmental. Most importantly, much of the literature concludes that military expenditures for defending oil supplies in the Middle East are small [6], and that reducing oil imports will have little effect on the amount spent for security in the Middle East ([2] and [8]). Furthermore, Bohi and Toman [8] suggest that an in-depth analysis would be necessary to produce a defensible estimate of the cost associated with U.S. military spending for oil import security. They state that this analysis should consider: (1) the rationales for military spending, (2) the effect of changes in the volume of oil imports on military spending, and (3) the effect of any reduction in oil imports on economic welfare. Until this analysis is completed, according to Bohi and Toman, the additional U.S. military spending that can be attributed to oil imports is too uncertain to be estimated.

Table 4. Summary of 1996 Military Expenditures for Defending Oil Supplies from the Middle East (Billion $)

	Original Estimate	Year of Original Estimate	1996 Estimate (Billions of 1996 $)
General Accounting Office [1]	$33	1990	$28[1]
Congressional Research Service [2]	$6.4	1990	$6[1]
Greene and Leiby [3]	$14.3	1990	$12[1]
Ravenal [4]	$50	1992	$60[2]
Kaufmann and Steinbruner [5]	$64.5	1990	$55[2]
Delucchi and Murphy[3] [6]	$20-40	1996	$20-40[2]

[1] Estimated based on a 3% annual inflation rate and a decrease of 30% in the total defense budget from 1990 to 1996 [7].

[2] Provided by the author(s). Thus, assumptions used for the projection are different from those used in Footnote No. 1.

[3] Annual cost to defend all U.S. interests in the Persian Gulf.

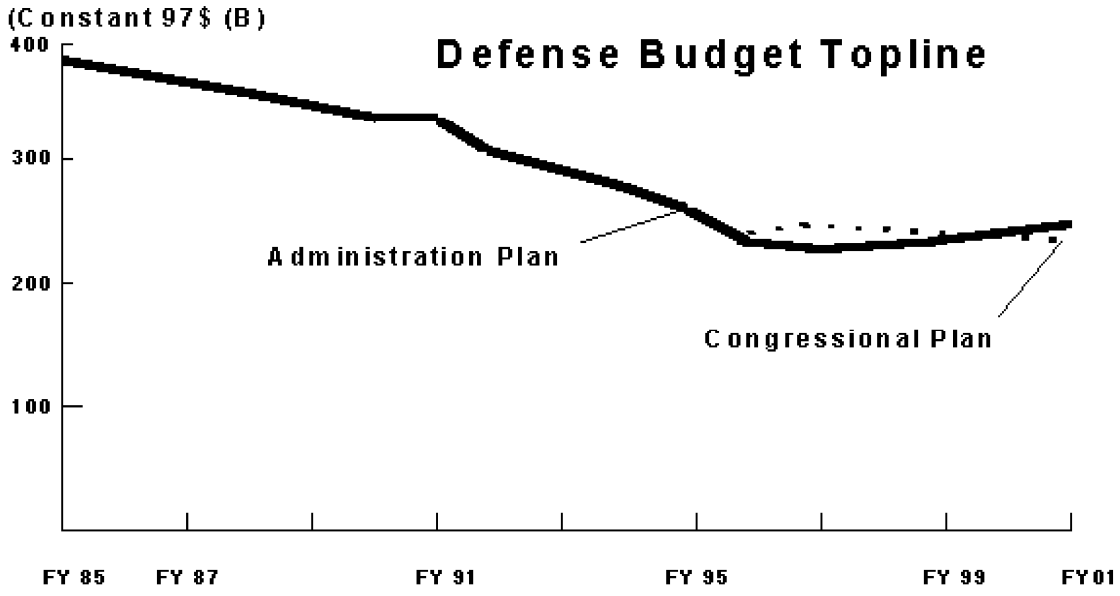

Figure 1. Projected Trends on Defense Budget [1]
(Billions of 1997 $)

[1] Souce: Johnson, S. and Blaker, J. *The FY 1997-2001 Defense Budget.* Strategic Forum, No. 80. Institute for National Strategic Studies, National Defense University. July 1996.

References

1. U. S. General Accounting Offices. Southwest Asia: Cost of Protecting U.S. Interests. GAO/NSIAD-91-250. Washington, D. C. August 1991.

2. Congressional Research Service. The External Costs of Oil Used in Transportation. A report prepared for the U.S. Alternative Fuels Council. Washington, D. C. June 1992.

3. Greene, D. L. and Leiby, P. The Social Costs to the U.S. of Monopolization of the World Oil Market, 1972-1991. ORNL-6744. Oak Ridge National Laboratory. Oak Ridge, Tennessee. March 1993.

4. Ravenal, E. C. Designing Defense for a New World Order: The Military Budget in 1992 and Beyond. Cato Institute, Washington, D.C. 1991.

5. Kaufmann, W.W. and Steinbruner, J. D. Decisions for Defense: Prospects for a New Order. The Brookings Institution, Washington, D. C. 1991.

6. Delucchi, M. A. and Murphy, J. U.S. Military Expenditures to Protect the Use of Persian-Gulf Oil for Motor Vehicles. UCD-ITS-RR-96-3 (15). University of California, Davis. California. April 1996.

7. Johnson, S. and Blaker, J. The FY 1997-2001 Defense Budget. *Strategic Forum, Number 80.* Institute for National Strategic Studies, National Defense University. Washington, D. C. July 1996.

8. Bohi, D. R. and Toman, M. A. The Economics of Energy Security. Resources for the Future, Washington, D. C. 1996.